Space Weather Forecast

Issued on Tuesday, 12 March 2024 at 00:56 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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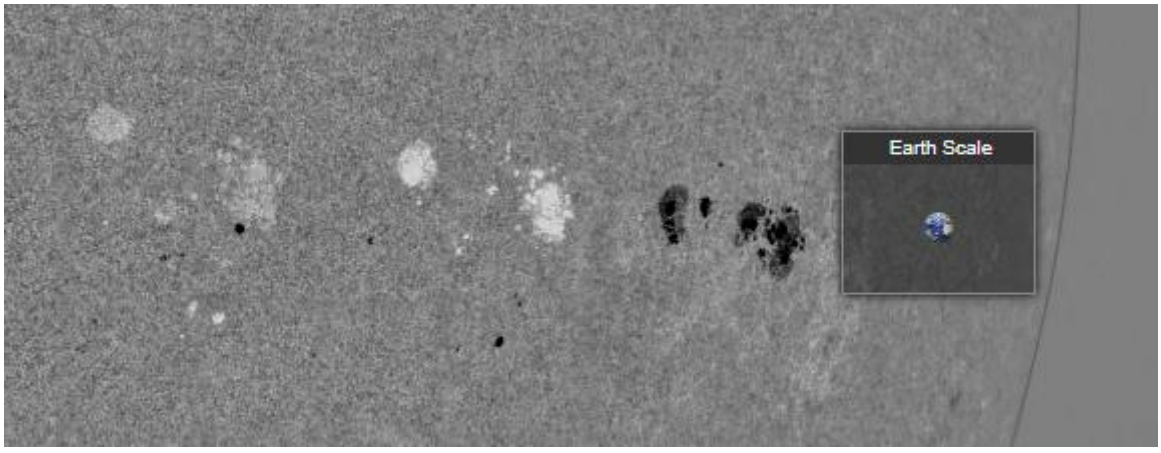
Space Weather Forecast Headline: Daily chance of Minor (R1) or Moderate (R2) Radio Blackouts, eventually reducing before UTC weekend.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has reverted to Low, with isolated Common-class X-ray activity recorded. The peak of these flares was an impulsive mid-ranking Common-class flare at 11/0850UTC from the largest and most complex group on the facing side. This sunspot group showed some development and spreading in its intermediate spots in the period, with penumbral area increasing.

The above sunspot region was one of four groups on the Sun, with a fifth potential growing bipolar region gradually becoming visible in the northeast. This and the other sunspot regions were however unremarkable by contrast to the largest group.

Figure 1: Helioviewer.org-generated visible light difference imagery of the largest sunspot region on the facing side, currently tracking through the southwest quadrant. The western solar horizon and Earth are also shown here for scale. Image validity times are 11/2300UTC for the black footprint, and 10/2300 and 09/2300UTC for the more eastward white footprints of the large sunspot group. Note the relative increase in area and spot count – this is in part the rationale for maintaining the daily chance of Moderate-class activity above raw values based on similarly-complex past sunspot regions.



There was some peripheral Coronal Mass Ejection (CME) activity seen in the period. These events included a coronal dimming from the northwest quadrant around 10/2300UTC, which was subsequently visible heading north and west of the Sun-Earth line to no effect. This was quickly followed by a CME to the south and west - this second event appears to be related to far-side activity to no effect at Earth.

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A third event - from the northwest quadrant - peaked 11/0853UTC. This event has yet to be modelled, but appears to far west to impinge on Earth. Finally, a 'prominence eruption' (arc of plasma) from the southwest was emitted 11/1230UTC. This event too has yet to be modelled but is likely to prove too far south and west of the Sun-Earth line to affect the forecast.

A faint CME emitted prior to this 24-hour window was tentatively associated with the 10/1215UTC M7.4 flare. This has now been analysed and may glance Earth later in the UTC day of Thursday 14 March to bring a Slight Chance of Minor Geomagnetic Storm G1.

Solar Wind / Geomagnetic Activity: Solar wind speeds declined from slightly elevated levels to background in the 24 hours, perhaps initially the tail of fast wind influence and then a slow solar wind regime.

The solar wind speed fell in the period, with the number of particles in the solar wind at background throughout. The associated magnetic field was stable and small-scale, while the north-south component was similarly modest.

The net result of the above solar wind measures was provisionally quiet activity, peaking well below Minor Geomagnetic Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed. High energy proton flux remained very slightly elevated above resting background levels in the period in the wake of the Moderate X-ray flare enhancement of 10 March, albeit on a declining trend and with a peak below 0.4pfu (where S1, Minor Solar Radiation Storm starts at 10pfu).

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily chance of Moderate-class flares from the largest sunspot region. This sunspot is expected to remain on the Earth-facing side until the end of the current UTC working week, whereupon the risk of Moderate activity should fall.

Solar Wind / Geomagnetic Activity: The 07 March CME has now most likely passed Earth to no effect and is dropped from consideration. A CME associated with the Moderate class flare from 10 March may pass Earth as a glancing blow later in the UTC day of Thursday 14 March, giving a peak risk of a slight chance of Minor Storm G1 for the period as a whole.

Coronal hole fast wind activity is likely to be modest in the period. All considered, activity may be a little disturbed through the first three days of the period, perhaps culminating in a slight chance of Minor Geomagnetic Storm G1 should the 10 March CME materialise. Activity should be most reliably quiet to round out the four-day period on Friday 15 March.

Energetic Particles / Solar Radiation: High energy proton flux is expected to persist at background or close to background levels, with a very slight chance of S1 Minor Solar Radiation Storms, with the main risk from the largest sunspot region.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	20
Very Active	R3 to R5 X	No	5	5	5	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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